BULLETIN
869

# PEACH GROWING

L. J. EDGERTON

Cornell Extension Bulletin

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A publication of the
New York State College of Agriculture,
a unit of the State University of New York,
at Cornell University

# Peach Growing

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IN THE United States peaches are grown more widely on a commercial basis than are any other tree fruit. More than half of the States produce peaches in commercial quantities. New York ranks about twelfth in production, with a 1940–1949 average yield of 1,285,000 bushels as compared with a total United States production of 71,150,000 bushels, including the clingstone crop in California. The number of peach trees in the more important peach-growing sections of New York is indicated in table 1. For the State as a whole there has been a decrease of 48 per cent in the total number of peach trees from 1930 to 1950.

*Table 1.* Peach Trees in the Leading Peach-Producing Counties in New York State*

| County | Total number of trees | | | Increase or decrease | | Trees of non-bearing age | |
|---|---|---|---|---|---|---|---|
| | 1930 | 1940 | 1950 | 1930–40 | 1940–50 | 1940 | 1950 |
| | *thousands of trees* | | | *per cent* | | *per cent of total* | |
| Niagara | 780 | 665 | 443 | −15 | −33 | 30 | 15 |
| Orleans | 309 | 243 | 108 | −21 | −56 | 29 | 10 |
| Wayne | 203 | 170 | 132 | −16 | −22 | 19 | 17 |
| Monroe | 170 | 137 | 138 | −19 | + 1 | 33 | 23 |
| Ulster | 198 | 120 | 93 | −39 | −23 | 48 | 32 |
| Orange | 154 | 96 | 71 | −38 | −26 | 41 | 31 |
| Schuyler | 77 | 62 | 38 | −19 | −39 | 21 | 26 |
| Total for State | 2,470 | 1,901 | 1,278 | −23 | −33 | 32 | 21 |

*From the United States Census. 1950 figures are preliminary.

The planting of peaches in certain areas, particularly South Carolina, Michigan, New Jersey, and some western States, has been heavy in recent years. This indicates an increased production of peaches in those areas during the next few years. In spite of the fact that the late varieties produced in New York do not compete directly as fresh fruit with Carolina and Georgia peaches, the continued increase in national peach production should be considered by New York growers before extensive new plantings are anticipated.

The bulk of the New York peach crop is harvested and marketed during September and early October. By this time three-fourths or more of

the total production of peaches in the United States has been marketed. Therefore, unsatisfactory prices may prevail in years when the crop from other sections has been heavy and when New York peaches are sent into markets that have received heavy supplies from the earlier producing regions. To successfully meet this competition, growers need to give attention to the production of high-quality fruit by planting improved varieties and the use of cultural practices that contribute to desirable fruit size, color, and quality. Elberta, which has been the leading commercial variety, fails to develop high quality in many seasons, particularly in western New York where it often matures during cool weather of early fall.

One of the reasons for the curtailment of peach planting in New York in recent years is high labor costs which in general have increased more rapidly than the price received by the grower for peaches. Pruning, spraying, thinning, and harvesting peaches as practiced by most growers require considerable hand labor. High yields and efficient labor practices will help to offset this disadvantage.

To achieve high yields and economical production, future plantings should not be made on unfavorable sites and questionable soils. Growers with orchards on poorly drained soils or in locations where low winter temperatures or spring frosts frequently reduce the crop cannot expect to compete successfully with those favorably located.

## Location of the Orchard

### Climatic Requirements and Site

The location of commercial plantings is largely determined by the minimum winter temperatures which the fruit buds and wood of the peach will withstand and the frequency of late spring frosts.

Spring frosts at blossoming time and low winter temperatures make it impossible to grow peaches to advantage in many sections of New York State. When the temperature drops to 10 degrees below zero, (–10° F.), a large proportion of the fruit buds are likely to be killed, particularly with the more tender varieties such as Elberta. With a gradual drop in temperature, there may be comparatively little killing, even at 15 degrees below zero (–15° F.), while a week or two of comparatively warm weather in mid-winter followed by a sudden drop in temperature to zero or slightly below may kill a large number of buds.

The wood of the peach is also relatively tender, being able to withstand a temperature only a few degrees lower than that which kills the fruit buds. There is likely to be more or less killing of the wood tissues of most varieties when the temperature drops to 18 or 20 degrees below zero (–18° or –20° F.).

Locations where late spring frosts are prevalent at blossoming time are unsuitable for peaches. Gentle slopes afford good air drainage and thus lessen the chance of injury to the blossoms by frost. Peaches on low, flat ground usually suffer more from spring-frost injury than do those planted on higher land. The regions of commercial peach production in New York are the western New York fruit counties, the Hudson Valley and Long Island, and the Finger Lakes. The principal peach-growing areas in New York are shown in figure 1.

Lake Ontario has a tempering effect which is felt for a distance from its shore, varying from 3 to 4 miles in some sections to 8 to 10 miles in others. This makes the growing of peaches in this region reasonably safe so far as killing temperatures of winter and late spring frosts are concerned. Even with this favorable lake influence, however, occasionally there is a winter so cold or a spring frost at blossoming time so severe that practically the entire crop is destroyed.

Some sections of the shores of the Finger Lakes seem well adapted to peach growing. The lake influence is felt only for a very short distance, but the land is usually elevated and orchards may be so located that air drainage is excellent. On the elevated slopes along the Hudson River

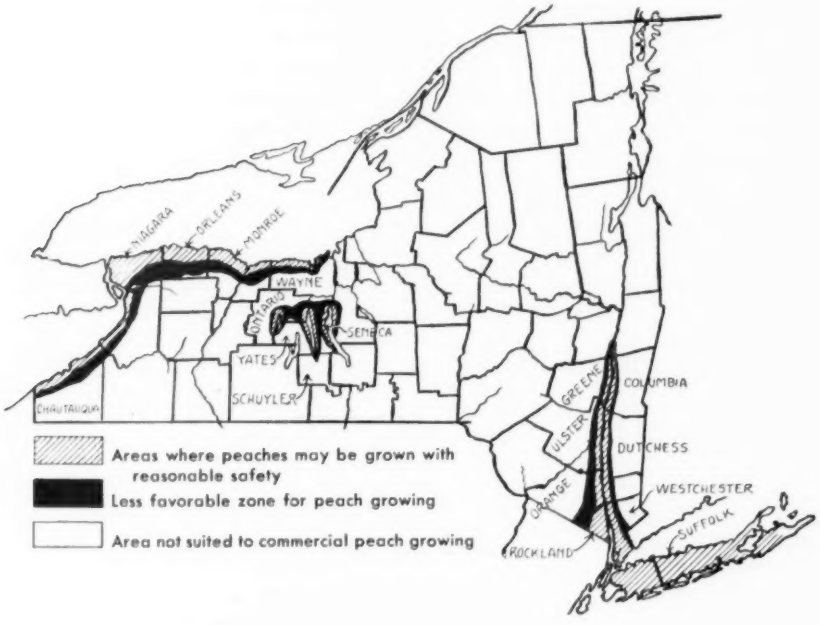


*Figure 1.* Peach-growing areas of New York

peaches are grown successfully, and some sections of Long Island are well adapted to the production of this fruit.

One should keep in mind that the peach, even in the most favored locations in the State, is not immune to winter injury and that the farther from the favored sections an orchard is located the greater is the risk. When there is a fair crop in the less favorable peach areas, it is quite probable that in the intensive peach districts of the State there is a full crop. Location, then, is important in the success or failure of peach growing and it demands careful consideration by the prospective grower.

**Soils**

Within areas where the climate is adapted to peaches, nothing is as important to the success of the enterprise as a suitable soil.

Experience has shown that deep and naturally well-drained soils are best. A soil that permits root distribution to a depth of from 3 to 5 feet produces trees that are longer lived, more productive, and better able to withstand such adverse conditions as drought, excessive rainfall, and low winter temperatures than does a shallow soil.

Orchards on poorly drained soils seldom produce maximum crops and even under average weather conditions trees here and there throughout such plantings are continually dying out (figure 2). With excessive rainfall in spring or in early fall, followed by subzero temperatures during winter, a large proportion of trees on poorly drained soils may be killed. The effects of soil depth and drainage on production and length of life of peach trees are shown in table 2.

Yield reduction due to shallow and poorly drained soils increases with the age of the orchard (table 2).

A deep well-drained soil provides a large reservoir of soil moisture and nutrients which the roots can explore. It is in dry years that fruit size will likely be greater on trees on a deep soil than on a shallow soil.

*Table 2.* Soil Effects on Peach Production and Longevity, Niagara County, 1926 to 1935*

| Soil description | Yield per tree | | Trees remaining after | |
|---|---|---|---|---|
| | 5- to 6- year trees | 13- to 14- year trees | 6 years | 14 years |
| | *bushels* | *bushels* | *per cent* | *per cent* |
| Shallow and imperfectly drained soils | 0.73 | 0.54 | 80 | 19 |
| Soils intermediate in depth and drainage | 0.89 | 1.13 | 73 | 62 |
| Deep and well-drained soils | 1.07 | 1.76 | 91 | 81 |

*Adapted from Cornell University Experiment Station Bulletin 710, *The Peach Enterprise in Western New York.* (Out of print.)

*Figure 2.* Peach orchard showing the ill-effects of poorly drained soil
Trees in the foreground are doing poorly because of heavy soil and poor soil drainage; some trees have already been removed.

Following winters when temperatures are low only orchards on the better soils and sites have a crop.

In Niagara County, Alton fine sandy loam, Alton gravelly loam, Dunkirk fine sandy loam, and Dunkirk gravelly silt loam are classed as good peach soils. The gravelly loams of the Hilton, Barker, and Lockport series are shallower and less well drained and are not so desirable soils for peaches. Water moves very slowly through heavy, compact subsoil. Whether the soil is a water-logged sand or a water-logged clay, the trees are likely to be small, shallow-rooted, and poor producers. Deep sandy and gravelly loams, such as the Alton and Dunkirk, are much more desirable for peaches.

Sites with a rolling topography or long slopes should be examined for evidences of past erosion. The depth of topsoil in a deep, well-drained soil has a large influence on peach-tree growth and yield. If the site has been eroded, tree growth and production will likely be lower on the eroded areas. The intensive cultivation which most peach orchards receive makes many of them definite erosion problems. Observations in some New York peach orchards show that soil-conservation problems should be considered as part of the site and soil selection.

If the site is not too cold or frosty, the soil is deep, well-drained, and not eroded, the problems of fertility can usually be met.

The poor growth which young peach trees often make in the location where an old peach tree had grown cannot be fully explained. It is usually unwise to plant a new peach orchard on an old peach site without several years' rotation in soil-building crops.

## Planting

THE development of the orchard plan and the actual planting of the trees usually requires many decisions which the grower must make for himself. Obtaining and handling the nursery stock, advisability of interplanting, spacing of trees, and time of planting are but a few of the details which require consideration. A plan that provides for efficient orchard operation throughout the life of the orchard should be developed before planting.

### Nursery Stock

The propagation of peach trees is seldom practiced by the orchardist. Nursery-grown trees are more uniform and generally prove to be less expensive. Well-grown, one-year-old, average-sized trees are to be preferred to either very large or second-grade stock. The young tree roots should be carefully guarded against drying out from the time they are dug in the nursery until planted in the orchard. As soon as the bundles of trees arrive from the nursery they should be opened and the roots and packing material moistened. If the trees cannot be planted promptly in the orchard, they should be heeled-in or they may be held for a time in cold storage. For heeling-in, a trench wide enough and deep enough to accommodate the roots is dug in a well-drained location; then the trees are placed in it and the soil worked in well about the roots as the trench is filled.

### Interplanting

The establishment of interplanted blocks of different fruits has both advantages and disadvantages. Several crops of peaches may be harvested before the apple trees begin to bear, thus reducing the actual cost of bringing an apple orchard into production. Where an early financial return is important in the development of an apple orchard, the use of filler peach trees might be advisable; but where supporting acreage is in production, interplanting would be less justified.

Some of the disadvantages of using peach trees as fillers are:

1. The intensive cultivation necessary for peaches is unnecessary for apples. It may be harmful to some orchard soils and sites where apples may be planted.

2. Spraying is complicated because of the different spray programs for the two fruits. The use of arsenicals for apples causes spray injury to peaches.

3. As the peach trees attain maximum size, they may shade and crowd the lower branches of the apple trees. Frequently peach-tree fillers are not removed soon enough to prevent some detriment to the apple tree.

4. If it is a good peach site, it eventually becomes occupied by apples.

Each orchard enterprise must be considered separately in deciding on the use of fillers. While it probably "pays" to use peach fillers in some instances, setting peach trees in solid blocks simplifies operations, results in orchards of longer life and usually gives a greater financial return on the initial investment.

**Contour Planting**

Many good peach sites are on slopes where there may be some erosion. Effective measures to prevent erosion in the peach orchard are contour planting and contour cultivation, coupled with good cover-crop practices. Although it is convenient to have the trees planted on the square, the grower must seriously weigh the advantage of soil protection against the spraying and tillage problems which a contoured orchard may present.

A peach site that produces when others freeze out is worth much effort

*Figure 3.* Peach orchard planted on the contour

The trees were set on terraces which followed the contour of this slope; contour cultivation is possible. The cultivated area between terraces should be cover cropped. (Photograph from U.S.D.A. Soil Conservation Service.)

in terms of soil maintenance; if it is subject to moderate erosin, it should be protected by contour planting and contour cultivation (figure 3). Professional assistance in laying out such contours is available through the Extension Service.

Usually, in orchards that are nearly level or in those with short slopes, contouring is not necessary. Square planting, with a good cover-crop program, less intensive cultivation, and ending each cultivation by going across the slope, usually is satisfactory.

**Planting Distances**

Spacing of trees in peach orchards in New York varies considerably. In some orchards, the planting was made on a former orchard site where the spacing would not permit a change without a loss in the maximum number of trees. In others, the crowding of trees may be the result of recommendations of nurserymen based upon the sale of a large number of trees. The planting distance may also be based on precedent or tradition in a given locality. Tree spacings in New York orchards range from 16 by 16 feet to 25 by 30 feet, with a fairly common spacing of 20 by 20 feet.

*Figure 4.* Peach trees set too close

These trees were set 20 by 20 feet on a good peach soil; the limbs of adjacent trees are now competing with each other and shading out the low fruiting wood.

The most advantageous planting distance depends upon the variety to be planted, the site, and perhaps the equipment to be used in the orchard.

A vigorous variety, such as Summercrest, utilizes more room than a weaker-growing variety such as J. H. Hale. Where the soil is deep and fertile, a 20-foot spacing is too close for most varieties. A planting distance that ultimately requires severe heading back of trees to permit use of present-day orchard equipment or to prevent crowding of permanent apple trees is of questionable value. For the orchard planted on the square system, 22½ feet is the closest spacing that permits full development of the trees and still allows room for orchard traffic. With vigorous varieties on fertile soils, the spacing could be increased to 22½ by 25 feet or 25 by 25 feet. There are 70 trees per acre with a 25-by-25-foot spacing, 86 at 22½ by 22½, and 108 at 20 by 20. The greater distance results in fewer trees per acre, but it eliminates crowding and improves light

*Figure 5.* Young peach orchard with trees set 22½ by 25 feet
This prevents crowding as the trees reach maturity and there will be enough light to maintain healthy, low bearing surface.

conditions for the lower limbs, making it possible to grow larger trees with a productive, low bearing surface (figures 4 and 5). This reduces production costs.

**Marking the Field**

Various procedures can be used in laying out and marking the field preparatory to planting. A common method is to establish a base line on one side of the field to be planted parallel with some permanent landmark, such as a fence or a road. Stakes are placed along this line where the trees are to be planted in the first row. A similar line is then run along one end of the field at right angles to the base line. The right angle can be constructed by the carpenters-square method in which 30, 40, and 50 feet are lengths of the sides of the right-angled triangle at the corner of the field. Stakes can be set along this line to correspond with the location of the rows. The other two sides of the field are then laid out and staked in a similar manner with a right angle established at each corner. With these outside stakes as guides, the remainder of the stakes can be placed to locate the trees in the rows by sighting both ways across the field. As the trees are being planted they should be sighted for alignment. Some growers prefer to use planting boards to insure the location of the tree at the point marked by the stake.

**Planting the Trees**

Spring planting has been the customary practice in establishing peach orchards in New York and is generally the preferred time. The danger of winter injury to the trunk and roots and of heaving of the newly set trees make fall planting more hazardous. If, however, properly matured trees can be obtained, fall planting would be feasible in protected areas where low winter temperatures are not common and where the pressure of spring work might delay setting the trees at that time. Fall-planted trees should not be pruned until the following spring.

The planting operation should be organized so the tree roots do not dry out in the field before planting. Wet burlap, straw, or packing material should be kept on the roots until the trees are planted. The roots should be moist when the tree is planted.

Little is gained by digging tree holes larger than is necessary to accommodate the root system of the tree to be planted. Some root pruning is usually practiced. Broken and discolored roots should be removed and the torn or bruised ends of roots trimmed but the root system should be reduced no more than necessary. The tree should be set about 1 or 2 inches deeper than it stood in the nursery, with the bud union just below the surface of the soil. Too deep as well as too shallow planting is objec-

tionable. Trees cannot be made to root deeper by deep planting. The depth of rooting depends upon the character of the soil.

As the hole is being filled, the soil should be worked around the roots and under the crown to prevent any air spaces. Moving the tree up and down carefully as the soil is being thrown about the roots helps to accomplish this. The soil may then be settled and firmed about the roots by tramping with the feet as the hole is filled. Trees should be so firmly set in the ground that they could not be pulled up without considerable effort.

A power post-hole digger may be used to speed the operation where a large number of trees are to be set.

## Pruning

IN TRAINING and pruning peaches, the grower should have in mind certain objectives and adjust the pruning operation to obtain them in so far as possible. The principal objectives are to: (1) develop a strong framework which will support heavy loads of fruit as the trees come into full bearing; (2) shape the tree for convenience in harvesting and other orchard operations; (3) improve size and qualiy of fruit on bearing trees by removal of weak and crowded wood; and (4) maintain vigorous shoot growth on mature trees.

The peach bears its fruit on wood of the previous season's growth. Therefore it is best to keep up a vigorous shoot growth throughout the life of the tree, and pruning is essential to obtain this growth. Although light pruning of young trees has an advantage, the mature tree requires more pruning relative to its size than is generally practiced with most other tree fruits.

### Training and Pruning Young Trees

#### Open-center system

Peach trees are usually trained to an open-center system during the first or second season in the orchard. The amount of pruning to be given the nursery tree at planting time depends upon its size and degree of branching. One-year-old nursery trees are usually from 3 to 7 feet in height with some lateral branching. These laterals which have developed in the nursery are, however, generally too weak to make good framework branches (figure 6), so all the laterals are usually cut back to short stubs with one bud at the base. This encourages the development of strong shoots on the trunk. As soon as the shoots have grown a few inches, usually by the first of June, three or four of the best ones may be selected for the framework branches and the others removed. The shoots which are selected should form wide angles with the trunk and should be well spaced about it (figure 7).

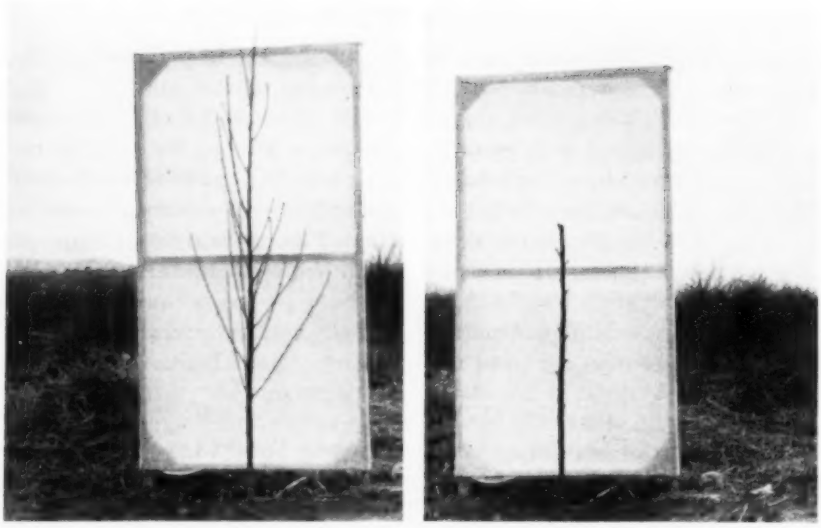

*Figure 6.* Peach tree before pruning (left) and after pruning (right) at planting time The laterals are cut to short stubs and the top headed back at about 30 inches.

*Figure 7.* Peach tree before (left) and after (right) selecting shoots for the framework branches

This is called *deshooting.* It would be best to deshoot somewhat earlier before the new growth has developed as much as that indicated in the photograph.

*Figure 8.* Tree cut back at 36 inches to permit wider spacing of shoots which will develop into scaffold limbs

Compare with figure 7 which was cut at 24 inches at the time of deshooting.

*Figure 9.* Strong, well-spaced laterals on this nursery tree

These laterals made it unnecessary to cut back to stubs. Four laterals have been selected and the top cut back at about 30 inches.

With the open-center system, it is customary to cut the top off at a height of from 20 to 24 inches to help to keep the tree low and spreading. If headed at this height, the three or four scaffold branches will usually be fairly close together on the trunk. A better spacing of the laterals and frequently a stronger framework can be obtained by leaving the main stem somewhat longer (figure 8).

Occasionally some trees have three or four well-developed laterals that can be chosen as scaffold limbs at planting time (figure 9). With such trees, it is not necessary to cut back to stubs and to deshoot later.

After the first year's growth, the three or four main branches that were selected by pruning or deshooting the previous spring are retained and any weak or crowding laterals that were overlooked or developed later in the summer are removed. The ends of these main branches may then be headed back lightly to an outer lateral. Any branches that have become

*Figure 10.* **Peach tree pruned after first growing season in the orchard**

**The three branches were cut back lightly to outward growing laterals to balance them with each other.**

quite vigorous may be cut back more severely to balance them with the others (figure 10).

Following the second year's growth the main laterals or scaffold branches should again be headed back lightly to outward growing laterals. Some of the side shoots or weak laterals arising from these main branches may be thinned (figure 11).

The purpose of this pruning is to develop a framework which will be strong for the life of the tree and to lay the foundation for a tree which will be low and spreading for convenience in picking, pruning, spraying, and thinning.

Pruning during the third and fourth years should be as light as possible, removing only any decidedly crowding limbs or low-hanging branches in the center that are becoming heavily shaded and heading back to outward laterals any of the scaffold limbs that are getting out of balance with the others. Heading back a limb and removing laterals from it tends to retard the growth of that limb relative to others. This pruning should consist mainly of thinning out – that is, the removal of only the particular crowded or shaded limb. It should not be a general heading back of the one-year growth. After the main framework is established, the goal is to get a large bearing surface as soon as possible.

#### Modified leader system

In addition to the open-center method of training, which is generally practiced, peach trees can be trained to the modified leader system, and some growers have been interested in its application. More care is necessary during the first two years in selecting and training scaffold branches than with open-center trees. Strong, vigorous nursery trees of good height are best for training to the modified leader system. The top is cut back at a height of about 3½ feet and the laterals cut to short stubs. When the

*Figure 11.* Two-year-old peach tree before pruning (left) and after pruning (right) The scaffolds have been headed back lightly and a few side shoots in the center of the tree have been thinned out.

new shoots which arise from the base of the stubs are from 3 to 4 inches long, four well-spaced shoots are selected to form the main scaffold limbs. Generally it is possible to space these laterals at least 4 inches apart up and down the stem, and they should be selected so no branch is directly above another (figure 12).

Pruning the modified leader tree during the next two or three years should consist of heading back the tops of the main branches or scaffolds that were selected by deshooting to keep them growing in the right direction and in proportion to each other. Usually this cutting back can be light and, where possible, the cut should be made to an outward-growing lateral. Any additional branches that arise from the trunk may be removed so the final scaffold system is limited to the three to five original laterals which were selected. In many instances the weak scaffold system and the

*Figure 12.* Training a peach tree to the modified leader system

Four well-spaced shoots have been selected; the uppermost one will form the leader.

eventual tree breakage of bearing trees are the result of allowing too many lateral branches to develop from the trunk, with resultant crowding and poor crotches (figure 13). This is true for either open-center or modified-leader training.

After the second or third year some small branches will develop on the inside of the tree; some of these may be left, as they contribute to early fruit production.

### Pruning Mature Peach Trees

As the trees come into bearing and attain full size more severe pruning is needed to maintain and renew fruiting wood of good vigor throughout the tree. Terminal shoot growth of 12 to 15 inches a year is desirable (figure 14). Short weak growth indicates that the trees are low in vigor, and that fruit-bud development and yield are likely to be unsatisfactory. Rank, branched terminal growth of 20 inches and more in length is an indication of trees of excessive vigor.

Pruning trees that are making terminal growth of satisfactory vigor while they are still comparatively young and on fertile soil consist mainly of thinning out the weak wood. As, however, trees become older and produce heavy crops, growth tends to slow down; some heading back is then necessary to encourage the growth of strong, new wood. In making such cuts, the strongest and longest branches should be headed back first to keep the tree at the desired size. The cuts are made to an outward-growing side branch in two- or three-year-old wood (figure 15).

It is not wise to make the many cuts needed to head back the majority of the shoots in the top of the tree as is sometimes done. This induces a dense growth in the top which shades the lower fruiting wood and interferes with development of good fruit color and quality. Rather, some shoots should be thinned out and some of the two- and three-year-old wood headed back to desirable laterals (figure 16). Heading back to stubs

*Figure 13.* The result of allowing too many scaffold limbs to develop near the same point on the trunk

This causes crowding and narrow crotch angles where winter injury and limb breakage may take place.

*Figure 14.* Shoots from mature peach trees showing different degrees of vigor A, too weak; B and C, satisfactory; D, too vigorous.

*Figure 15.* An eight-year-old Golden Jubilee peach tree after pruning
A few of the tallest branches in the top of the tree have been headed back into two-year-old wood at the point of origin of a strong outward-growing lateral. There has been some thinning in the top and outer branches.

should be avoided as these are slow to heal and peach canker may develop in such wounds.

A buck rake or brush pusher mounted on a tractor is the most satisfactory tool for removing the prunings. This need not be a thorough job because the disc will cut up the smaller twigs.

**Time to Prune**

In the commercial peach area of western New York near Lake Ontario, winter temperatures are seldom low enough to cause winter injury to buds or wood. Within this limited area, peach pruning is frequently done during the winter as time and weather permit. Outside of this relatively small area, however, it is better to delay pruning until about March 1. After a severe winter when many of the fruit buds have been killed, pruning could be less severe than when the buds give promise of a full crop. If practically all the buds appear to be killed following a period of low temperature, growers can make use of the opportunity, wherever necessary, to cut back in the tops of the trees and to thin out the wood enough to establish a more desirable height and size of tree and to encourage

*Figure 16.* An eight-year-old Halehaven peach tree after pruning
The center and top of this tree have been thinned enough to permit good light penetration. The lower limbs are productive and will bear fruit of good color and quality.

the renewal of fruiting wood. Severe heading back into the main branches or "dehorning" should be avoided. It has been observed that trees with some winter injury are less likely to survive after receiving this severe pruning. Also, the large pruning wounds do not heal properly and may favor the entrance of wood-destroying organisms.

Wherever possible, trees should be kept within bounds by moderately severe pruning each year. If the bearing peach tree is not pruned enough each year, the tendency is for the fruiting wood to develop farther out and higher up and a thick, leggy tree may soon develop without low fruiting wood (figure 17).

Another reason to delay pruning until late winter is to check the spread of peach canker. This disease is more likely to become established where early winter pruning is practiced.[1] The wounds made by winter pruning may become infected before they can form callus tissue and begin to heal

[1]Peach Cankers and Their Control. By E. M. Hildebrand. Cornell Extension Bulletin 657. 1944. (Out of print; available in libraries only.)

*Figure 17.* A twelve-year-old Elberta peach tree before pruning *(left)* and after pruning *(right)*

This tree had not received enough pruning for two years and was becoming tall and thick-topped. The center and the top of the tree have been thinned and the upright limbs headed back into three-year-old wood.

over, and winter injury may occur near the cut, which favors the development of peach canker.

If there are other tree fruits in addition to peaches, it is preferable to prune them during the forepart of the winter and to prune the peaches in late winter or early spring.

## Soil Management

### Cultivation

CULTIVATION has long been considered one of the essential practices in growing peaches. Many growers in the past have felt that the success of their peach enterprise was measured by their ability to eliminate completely all weeds and grass in the orchard by intensive and frequent cultivation throughout the spring and summer. Such intensive cultivation, however, rapidly depletes the organic matter in the soil and encourages soil erosion. As fruit growers have become more concerned about proper soil management, the frequency of cultivation and the length of the cultivation period have been reduced.

Soil management in peach orchards should fulfill two purposes: (1) the removal of enough weed and cover-crop growth during spring and early summer to permit vigorous tree growth and good fruit size, and (2) the maintenance of the orchard topsoil to permit a sustained high production over the life of the orchard.

Fruit buds of the peach, which produce flowers and fruit the next year, are formed along the new shoot growth. It is advisable, then, in so far as is possible by cultivation, to make conditions favorable for vigorous, early growth of new wood. The first cultivation in the spring should be made as soon as the soil is in good workable condition. Early cultivation encourages the new growth to develop earlier in the season. Then the

growth can be checked by ending the cultivation in mid-summer and sowing cover crops. This favors early maturity of the buds and wood in the fall, making the trees more resistant to winter injury. In disking or plowing, care should be taken not to work the soil more than from 3 to 4 inches deep near the trees. Deeper tillage may cut away many of the surface feeder roots.

Cultivation of the orchard should be continued from early spring until about the middle of July. There is no set rule about the number of times the orchard should be cultivated to obtain the desired growth and fruit size nor about the extent of the soil-conserving practices that should be followed. Growers who work their orchards into late August or throughout the summer and those who cultivate every week or ten days might well effect a substantial saving by reducing the number of cultivations. Cultivation need be only frequent enough to keep the weeds down until the cover crop is sown. In a year of normal rainfall, little or nothing is gained by working the soil more than four or five times.

Weed removal should be more thorough and more prompt on shallow soils and in dry years than on deeper soils or in wet years. Also, the bearing orchard usually requires a longer cultivation period than the young peach orchard because of the extensive moisture supply needed to mature a crop of peaches.

*Figure 18.* Trashy cultivation in a mature peach orchard on a slope. This less-intensive cultivation helps to reduce erosion on this slope.

The soil-conserving value of weeds or cover crop residues is largely lost when they are turned under. Such residues may best be handled, particularly where erosion is a problem, by "trashy" cultivation, which leaves much of the cover crop and weed residue on top of the soil (figure 18). This may be accomplished by adjusting the disk or cultivator so it does not cut so deep and turns over less soil.

**Cover Crops**

To be most effective, a cover crop should completely cover the orchard soil from late summer until the following spring. No one cover crop is the most satisfactory under all conditions; the best crop is the one that makes the most growth and the most complete soil cover (figure 19).

No overwintering legumes have proved to be superior to other plants for peach-orchard cover crops. Domestic ryegrass, wheat, rye, vetch, and buckwheat are some of the more commonly used cover crops. Domestic ryegrass is usually sown at the rate of 15 to 20 pounds per acre, wheat and rye at 2 to 3 bushels per acre, and vetch at 20 to 40 pounds per acre. A combination of rye and vetch has been used successfully by some growers. The principal objection to rye is its rapid growth in the spring. Unless it is plowed or disked under promptly at 4 to 5 inches in height it may compete seriously with the trees for soil moisture and nutrients.

In the bearing peach orchard, the cover crop should be sown during

*Figure 19.* The cover crop in this orchard has made good growth by late fall The crop was seeded in July and will be disked under in the spring.

early August. If the soil is very dry, the seeding might be delayed beyond this date until there is enough rainfall to insure seed germination and to prevent the possible competition of a developing cover crop.

Where weed growth is heavy and fairly uniform throughout the orchard, it may be used as the cover by simply ceasing cultivation and allowing the weeds to grow (figure 20). In most orchards, however, this will not result in an effective soil cover and should be supplemented by a sown cover crop. Usually the areas where weeds do not thrive are those most deficient in organic matter and the most in need of a good cover.

### Mulch

Peach trees grow and produce good crops under a heavy straw mulch. From 100 to 200 pounds of straw or of some similar material per tree is needed. When the mulch is first applied, somewhat more nitrogen fertilizer per tree is needed, but after one or two years the amount of nitrogen may be cut to about half that normally applied. In the commercial fruit-growing areas, mulching material is often scarce and expensive. Also, there is the added danger of mice and fire in mulched orchards. The main value of this practice in peach orchards is on sites so steep that erosion cannot be controlled under the cultivation-cover crop system.

## Fertilizers

THE application of a nitrogen-carrying fertilizer is a common practice in New York peach orchards. Ammonium nitrate, nitrate of soda, and sulfate of ammonia are three nitrogenous fertilizers that have been used most frequently. While nitrogen fertilization proves beneficial in most

*Figure 20.* Volunteer cover crop of weeds in a young peach orchard

orchards, its careless use produces excessive growth. Trees making rank, vegetative growth do not mature properly in the fall and early winter and are more susceptible to winter injury. Fruit on such trees is also of poorer color and quality, and is often slower to ripen. Trees making weak growth and poor foliage color are sometimes given heavy nitrogen applications without a thorough inspection to determine whether borer infestation, poor soil drainage, or winter injury may be the cause of poor growth.

The amount of nitrogen to apply varies from the few ounces of ammonium nitrate applied to one-year-old trees to as much as 2 or 3 pounds per tree which is satisfactory in mature orchards on soil of average fertility where cultivation is discontinued by midsummer and cover cropping practiced. The amounts of nitrate of soda or sulfate of ammonia would be approximately twice as much because of their lower nitrogen content. A specific recommendation for trees of a given age is not practical because of variations in soil fertility from orchard to orchard and even between different areas within the same orchard. Trees should receive only enough nitrogen to maintain the desired amount of new shoot growth. Experience has shown that from 12 to 15 inches of annual growth is about right for mature trees.

The effect of nitrogen fertilization on fruit color and quality and harvest maturity must also be considered along with is effect on shoot growth. Trees that are making rank growth because they are growing in deep, rich soil or receive large amounts of nitrogen usually produce fruit which is poorly colored and late in reaching maturity, particularly where late cultivation is practiced with little opportunity for cover-crop growth. The goal should be a nitrogen level which will promote satisfactory shoot growth with healthy leaf color throughout the summer, but not so heavy that vegetative growth is prolonged at the expense of fruit color and quality. By careful observation a grower can adjust his fertilizer practices with the pruning severity and the cultivation–cover-crop program to obtain these objectives.

The application of nitrogen fertilizer is best made in the early spring about two to three weeks before bloom. If it is to be distributed by hand, it would be best to apply the fertilizer under the tree from the trunk to the outer spread of the branches. Nitrogen applied in the fall or in split application in the spring has not generally proved superior to a single spring application.

Potassium deficiency has appeared in a few New York peach orchards.[2]

[2]Responses of Young Elberta Peach and Montmorency Cherry Trees to Potassium Fertilization in New York. By Damon Boynton. Proc. Amer. Soc. Hort. Sci. **44**: 31–33. 1944.

The symptoms of potassium deficiency in such orchards have been small, light green leaves which are wrinkled abnormally at the midrib and folding or rolling toward the upper surface. Trunk injury due to borers, tillage machinery, or winter killing will, however, often cause similar leaf symptoms. Where the cause is potash deficiency, it can be corrected by the application of muriate of potash or sulfate of potash. The rate of application for mature trees is about 3 pounds per tree; for two-year-old trees ½ pound of the potash carrier per tree per year is enough. The application of manures or mulches, or the use of a potash-bearing complete fertilizer, to increase cover-crop growth are practices that tend to prevent peach trees from becoming deficient in potash.

It is unlikely that peach trees in New York would respond to the application of fertilizer elements other than nitrogen and potash. With good soil management in the peach orchard, the maintenance of the full topsoil depth will help to prevent nutrient deficiences. The application of complete fertilizers is sometimes found advantageous on the lighter soils to promote better cover-crop growth; where this is accomplished the trees are likely to benefit. For such a purpose the fertilizer would be broadcast over the entire orchard area.

## Thinning

THINNING is frequently practiced with many of the cultivated fruits but probably no fruit is benefited more by thinning than the peach. Unless fruit-bud injury results from winter freezes or spring frosts, peach trees generally set several times as many fruits as the trees can possibly develop to a desirable commercial size. Such overloading should be prevented, as the fruit at harvest time is likely to be small, unattractive, and of poor quality, and limb breakage may be excessive. Thinning has the effect of increasing the leaf area per fruit because of the removal of the excess fruit on a given branch or twig. Thus each remaining peach is supplied with a larger volume of food materials that results in better size and the higher sugar content associated with improved quality (table 3).

*Table 3.* Effect of Thinning on Size and Quality of Peaches*

| Leaves per fruit | Average size | Total sugars |
|---|---|---|
| *number* | *inches* | *per cent* |
| 5 | 2 | 5.4 |
| 20 | 2⅜ | 7.6 |
| 75 | 2¾ | 9.0 |

*The Relation of Leaf Area to Size and Quality of Peaches. J. H. Weinberger. Proc. Amer. Soc. Hort. Sci. 28:18–22. 1932.

Taking into account tree condition, yield, and future performance, about 30 to 50 leaves are required per fruit for the development of commercial size and quality. On a mature peach tree that has a heavy set of fruit, a large proportion of the devel-

oping fruits may be removed and still not appreciably reduce the number of bushels of fruit which the tree will produce. The fruits which are left after thinning grow enough larger in size to at least partially make up for the difference in numbers. For example, 190 peaches 2½ inches in diameter fill a bushel container, while 380 peaches 2 inches in diameter are needed for a bushel.

**Hand Thinning**

The most common method of thinning has been to hand thin the fruits to some standard distance apart. This is usually from 6 to 8 inches, depending upon the specific circumstances. Variety, age, and vigor of the trees, and the premium paid for large fruits all influence the amount of thinning. Heavier thinning is made in dry seasons and on old trees that lack vigor. Varieties such as Greensboro, Rochester, and Raritan Rose, which tend to set heavily and whose fruits are naturally small, must be thinned heavily if they are to develop fruits of commercial size.

Hand thinning to a spacing pattern such as this is fairly successful when done or supervised by experienced growers with an appreciation of how many peaches of good size can be produced by a given tree under existing soil and climatic conditions. Often, however, far too many peaches are left on the tree, particularly in the hands of inexperienced thinners.

Peaches of best size and color are produced on the more vigorous new wood principally in the top and outer part of the tree. Such wood can support peaches closer together than can the weaker wood in the interior of the tree.

Thinning peach fruits to a given number for a tree of a given size is practiced by some growers in certain regions, particularly where peaches are grown for canning purposes. The approximate yield or number of peaches of a particular size which the tree will develop is determined by the grower on the basis of his previous experience. The success of this procedure depends chiefly upon the experience and ability of the individual who uses it.

Close supervision of the thinners by the grower or a well-trained foreman will do much toward achieving a satisfactory thinning job with whatever method is used.

Some growers speed up the thinning job by "club thinning." Clubs of convenient length are prepared by placing a rubber hose over one end of a broom handle or over some other suitable stick. The peaches are then knocked off by striking the branch with the padded end of the club. With this method an inferior thinning job is usually obtained, with irregular spacing of the remaining peaches, but the thinning is more rapid and costs are reduced.

The relation between pruning and thinning should also be borne in mind by the grower. In the peach, thinning and pruning practices should be particularly well correlated. If light pruning is practiced, heavier thinning will usually be required. On the other hand, a moderate to heavy pruning may considerably lessen the amount of thinning needed to produce fruits of the desired quality and size.

### Time to Thin

As a commercial practice most growers wait until just after the June drop is over before starting to thin. At that time the extent of the thinning job can best be determined. Also, a better appreciation of the sizing ability of the trees can be made than would usually be possible at an earlier date. For the greatest benefit, thinning should be completed as soon as possible; with the early maturing varieties being thinned first. Some benefit may be expected from thinning even if it is prolonged until a few weeks before harvest.

### Chemical Thinning

Extensive orchard tests in New York and elsewhere during the past few seasons have demonstrated that most of the hand thinning can be eliminated on varieties that tend to flower and set heavily by spraying at full bloom with a dinitro compound.

The dinitro materials applied at the proper stage of bloom development prevent the setting of many of the flowers. The most satisfactory job of thinning has resulted when bloom development is rather rapid and uniform, and when the spray is applied at approximately full bloom, with 90 to 95 per cent of the flowers open (figure 21). Both the liquid and dry commercial dinitro formulations have given good results and will thin to about the same degree if the same amount of toxicant is used.

*Table 4.* Appropriate Concentrations of Dinitros per 100 Gallons Water for Thinning Peaches

| Variety | Dinitro* slurry | Dinitro* liquid | Dinitro* powder |
|---|---|---|---|
| | *pints* | *pints* | *pounds* |
| Golden Jubilee | 1 | ½ | ½ |
| Valiant | 1 | ½ | ½ |
| Veteran | 1½ | ¾ | ¾ |
| Halehaven | 1½ | ¾ | ¾ |
| Rochester | 2 | 1 | 1 |
| Elberta | 1 | ½ | ½ |
| Redhaven | 1½ | ¾ | ¾ |

*Slurry: Elgetol, Krenite
Liquid: DN No. 289; Elgetol No. 319
Powder: DN No. 1

The suggested concentrations of dinitro for thinning some of the commercial peach varieties in New York are given in table 4.

The advisability of chemical thinning depends largely upon the same requirements as those for hand thinning, such as the normal tendency of the variety to over-set and the extent of winter injury to the buds. Occasionally, some fruit buds are killed by low winter temperature, particularly when sudden

*Figure 21.* Flowers of Oriole *(left)* and Veteran *(right)* at proper stage for application of dinitro blossom thinning spray

freezes follow periods of mild temperatures. The amount of bud killing should be accurately determined before attempting any chemical thinning. Fruit buds that have been winter killed are black in the center. They do not develop to the full-bloom stage but drop off as the uninjured buds begin to swell. Trees that have made weak growth the previous season because of poor soil, improper soil management or fertilization, or because of dry weather are not so heavily budded as trees that have made strong growth. Under such conditions blossom thinning might not be advisable or the concentration used could be decreased somewhat. Frost damage at blossom time is not a common hazard in New York, as commercial orchards are generally near the lake or on higher elevations where air drainage provides protection against late spring frosts.

The important advantages of blossom thinning as compared with hand thinning are the following: (1) a saving on the expense of hand thinning; (2) improved size and quality of fruit because of the earlier thinning; (3) better shoot growth, particularly in a dry season, which contributes to the potential crop for the next year; and (4) improved cold hardiness of the buds during the following winter.

Some recent tests have shown that it is possible to thin peaches with hormone sprays of naphthaleneacetic acid applied from four to six weeks after full bloom. Such a spray also saves the expense of hand thinning, and might have an advantage over the dinitro sprays in that the need for thinning can often be more accurately appraised at the time it would be applied than is possible at full bloom. Hormone thinning might also be more satisfactory in seasons when bloom development is slow and it is difficult to select a time when a large proportion of the flowers are in the proper stage for the dinitro application.

Information on progress with chemical thinning sprays for peaches is supplied periodically to the County Agricultural Agents in the commercial fruit areas of the State. Growers may obtain from them the suggestions as to materials and concentrations which would be expected to give satisfactory thinning for the different varieties under prevailing conditions.

## Harvesting

### Fruit Maturity

Determining the proper stage of maturity at which peaches should be harvested requires experience and careful judgment on the part of the grower. Peaches should be left on the tree as long as possible to permit the development of the highest color and sugar content and the largest size. Such fruit when it reaches the consumer in sound condition commands a premium.

Since there is usually good demand at a high price for the first few baskets of peaches offered for sale, many growers start to pick early and soon the market is flooded with immature peaches. This results in a drop in the price, but harvesting continues and immature peaches may be picked and marketed throughout the remainder of the season. Growers in general appreciate that the peach is a highly perishable product and it must be handled promptly to reach the consumer in sound condition. Peaches that are picked too early lack flavor and have not developed their best color and size.

The degree of maturity to which the fruit may be allowed to develop depends largely on the marketing method. Where a "firm ripe" peach is required, the best index for orchard use is the change in ground color to yellowish or light orange-yellow for the yellow-fleshed varieties while the peach is still firm. With the white-fleshed varieties, the ground color change is from green to pale green or whitish. Experience in handling and storing peaches has shown that fruit picked in this condition holds up in transit with no more loss than for fruit harvested in a more immature stage of development.

For roadside markets and local trade, harvesting can usually be delayed until the peaches are "tree ripe." At this stage the full yellow or white ground color has developed, the full blush of the peach has been reached, and it is ready to eat or can.

Not all the fruits on a tree attain the desired stage of maturity at one time. Therefore, most growers pick over their trees at least two or three times, taking off only those fruits that have reached the desired size and color and leave the smaller, less mature fruits to gain size and color before being harvested. Close supervision and training of the pickers in the orchard helps materially in the selection of fruit of the desired maturity.

In some years, particularly with Elberta, there is danger of loss from the fruit dropping before it has attained its full yellow color and blush. This loss may be reduced by more frequent picking, and selecting the fruit before all the green ground color has disappeared.

**Picking**

With a fruit as perishable as the peach, careful handling is necessary to prevent cuts, bruises, and deterioration. Picking containers in common use are half-bushel baskets, metal pails, and picking buckets with a canvas drop-bottom of the type commonly used for apples. Baskets of the half-bushel hamper type may be conveniently carried under one arm by a wide strap that passes over the shoulder and has large hooks attached to the basket. When the basket has been filled, the strap is unhooked and replaced with an empty basket. Those baskets are then hauled directly to the packing house.

Pickers should be taught to place the peaches carefully in the container, and where picking buckets are used care must be exercised in emptying the bucket into the orchard container. The fruit should be picked by taking it gently in the palm of the hand and twisting it sidewise to prevent bruising and tearing the flesh about the stem. Carelessly removing the peaches with the finger tips is likely to result in small bruises which become discolored later and reduce the attractiveness of the fruit.

## Packing

MANY kinds of equipment are used by peach growers to grade, size, and pack peaches. The type depends largely upon the acreage and varieties grown, as well as on the marketing channels through which the fruit is handled. The prospective buyer should familiarize himself with the various makes and models of equipment before he decides which is best adapted to his needs. Convenience, freedom from bruising, accurate sizing, capacity, and cost should be compared in considering the purchase of a sizer. Where many peaches are to be packed, the sizer, regardless of its make, should have a sorting belt or table where the undesirable fruit may be easily removed.

Machines are on the market which brush and remove the fuzz from the peaches before they are packed. Many growers now defuzz peaches and often receive a premium for such fruit. Peaches from which the fuzz has been removed are, however, more subject to subsequent brown-rot infection because of the removal of most of the sulfur deposit during the fuzz-removal process. This disadvantage may be overcome by dusting with sulfur after brushing and prior to packing. Some brushing machines are equipped for this process or an application of dust may be made in the orchard about a week before packing to help to reduce possible loss from brown-rot.

A large proportion of the New York peach crop is marketed in the conventional bushel straight-sided or "tub" basket. Smaller containers, such as the one-half bushel hamper or the New Jersey basket, are used to some extent, particularly for local-market and roadside-stand trade.

Ringfacing baskets is now common practice. The attractiveness, carrying quality, and market value of the ringfaced basket is superior to the jumble pack. A ringfaced pack provides a uniform surface so each fruit receives a part of the pressure of the cover. Fruits of uniform size and color and representative of the contents of the basket should be used for the face. Facing forms and basket turners are available which help to ringface and pack rapidly. In filling baskets one should rack or shake them down two or three times to insure against a "slack pack" on arrival at destination.

## Storage

It is often advantageous to hold for a time in cold storage a part or all of the crop. Market conditions or inability to get the fruit to market when ready for shipment may make it imperative to store the fruit. In a study of peach marketing in western New York,[3] it was found that peach prices generally did not advance enough toward the end of the shipping season to cover storage and carrying costs so unnecessary storage holding has not generally proved profitable. Years in which the peach crop matures earlier than normal have tended to be the more successful storage seasons.

After peaches are harvested, the ripening process continues, and the higher the temperature the faster they ripen. If the temperature of the fruit is lowered, the ripening process is materially retarded. Firm ripe peaches free from bruises or brown-rot infection may be held in cold storage at 32° F. for two to four weeks. The length of time that they can be stored depends mainly on the promptness with which they are put into cold storage after harvesting, on the mature but still firm-ripe condition of the fruit, on its freedom from brown-rot spores and bruises, and on the evenness of the temperature at which it is held. Peaches held in storage too long lose their flavor and tend to discolor around the pit, and bruised areas present a darkened, unattractive appearance.

## Marketing

There appears to be a growing consumer acceptance for tree-ripened peaches and for smaller consumer packages. Handling the peach crop in this fashion appears to be a good policy whenever possible.

Usually, growers who have made an effort to supply the consumer with tree-ripened peaches have increased sales. It is generally agreed that the bushel basket is too large a package for tree-ripened peaches. Half-bushel baskets and even smaller consumer-sized packages have been acceptable containers for high-quality, tree-ripened peaches.

In years of heavy peach production, good results have been obtained with regional, state, and local sales promotional programs to increase the utilization of peaches. The many uses that may be made of peaches and the varieties in good supply and suitable for canning and freezing are brought to the attention of the consumer.

[3] The Peach Enterprise in Western New York. By Herrell F. DeGraff. Cornell University Agricultural Experiment Station Bulletin 710. 1939. (Out of print. Available in libraries only.)

## Varieties[4]

THE Elberta, although not of the highest quality and tender in bud, is the leading commercial variety. Its main assets are productiveness and large, firm, attractive fruits. The earlier varieties provide the market with peaches nearly six weeks in advance of the Elberta and, if properly selected and not overplanted, are usually remunerative.

†**Mikado.** Yellow, with a bright blush; round, very attractive, medium sized; semi-cling, good quality; season first week of August, earliest yellow; fruit bruises easily but has value for local market; tree vigorous, productive; requires cross-pollination.

†**Early-Red-Fre.** An early freestone; white fleshed; of high quality; ripening about three days after Mikado. It is only slightly hardier than Elberta.

†**Marigold.** Yellow, with bright blush; round, very attractive, medium sized; semi-cling; five days later than Mikado and better in quality; valuable for local market; tree vigorous and productive.

†**Oriole.** Yellow, with dark red blush; attractive, distinct pubescence; round, medium sized; flesh firm, with a slight greenish tint toward stone, freestone, very good quality; season middle of August; tree vigorous, productive, hardy in fruit bud.

†**Jerseyland.** Yellow, with bright blush; ripens about one week later than Mikado; rather pointed in shape, freestone when picked ripe and of good quality; hardy in fruit bud.

†**Redhaven.** Yellow, highly colored; freestone; very firm flesh for an early peach; quality good to excellent; ripens about with Golden Jubilee; tree vigorous, sets a heavy crop that requires thinning.

†**Raritan Rose.** White, highly blushed; most attractive, medium in size; freestone, good quality; flesh clear white; season with or before Golden Jubilee; tree vigorous, spreading, productive, and hardy.

***Golden Jubilee.** Yellow, with a slight blush; attractive, oval, large; freestone; good; season a few days after Oriole; bruises rather easily but is valuable for local market; tree vigorous and productive.

**Triogem.** Yellow, highly colored; attractive with short pubescence; freestone; firm flesh that stands handling better than most peaches of its season; quality very good; ripens a few days after Golden Jubilee; trees vigorous, productive, and may require thinning.

[4] Taken in part from Cornell Extension Bulletin 733, *Varieties of Fruit for New York*. The varieties starred(*) are those that are the most important commercially and should have precedence in planting for the general market. Those marked with a dagger (†) are promising for trial. Varieties not marked are either new sorts that have gone beyond the first preliminary testing and warrant further trial or are old sorts that succeed under special conditions.

**Vedette.** Yellow fleshed; usually freestone; good quality and attractive; ripens about five days after Golden Jubilee; tree moderately vigorous and a regular producer.

**Valiant.** Yellow, with bright blush; very attractive, roundish, medium to large in size; firm, stone free and small; season end of August; very good; tree medium in vigor and productive.

†**Sunhigh.** Yellow-fleshed, oval; highly colored; large, freestone, firm fleshed, and has short pubescence; one of the best in quality.

†**Red Rose.** White, highly colored; freestone; firm texture; quality superior to that of any other early white peach; ripens a day or two before Halehaven.

***Halehaven.** Yellow, highly blushed; very attractive, large; freestone; excellent quality; skin tough; season of South Haven; tree vigorous, productive, and hardy; will probably replace its South Haven parent.

**Veteran.** In fruit characters similar to Valiant except less well colored; season a few days after Halehaven; tree very hardy, medium in vigor; requires heavy thinning; flesh tends to adhere to pit some years; good for freezing.

**Champion.** White, blushed; roundish, medium size, attractive; fruit juicy, semi-free, highly flavored; tree vigorous and productive.

†**Stark's Early Elberta.** Yellow-fleshed; attractive; freestone, good quality; bears regularly; ripens about nine days before Elberta.

**J. H. Hale.** Yellow, brightly blushed; very attractive, roundish, very large, firm; freestone; good; tree medium in vigor and lacking in hardiness; like Mikado, it has abortive pollen and must be interplanted with varieties having good pollen.

***Elberta.** Yellow, with a bright blush; attractive, oval, large, firm; freestone; good; tree large, vigorous, productive; still the leading commercial peach although less hardy and less highly flavored than most other varieties.

## Winter Injury

PEACH trees, even in the most favored sections of the State, occasionally suffer damage from low winter temperatures. A common form of winter injury and the one which growers are frequently concerned about is the loss of the peach crop or the serious reduction in yield because of the killing of fruit buds during winter or early spring. Also, the trees themselves are sometimes killed back severely by an extreme drop in temperature.

Less severe forms of winter injury may also result in loss to the grower,

although their evidence may not be so conspicuous at first. The crown, trunk, crotches, or the area around pruning wounds may be winter injured. This injury may then provide entrance for the lesser peach tree borer and the peach tree canker disease which will further weaken the tree and considerably shorten its life.

The orchards that ordinarily suffer most are those in a weakened condition because of poor soil drainage or shallow, eroded soils, or from lack of pruning, thinning, or fertilization. Trees which have made vigorous, late growth and thus have gone into the winter with the wood and buds poorly matured are also subject to injury.

Trees that make a vigorous growth during spring and early summer and mature their wood by fall stand less chance of winter injury than do weak trees and those that grow late in the year.

The management of the peach orchard should include moderate pruning of the trees, early cultivation with cover cropping in late summer, moderate fertilization, and thinning when necessary to prevent overbearing. Such a program, coupled with insect and disease control, is essential for the production of the most fruit of the best quality and also lessens the chances of winter injury to the fruit buds and the wood.

There is also considerable difference in the cold hardiness of the fruit buds of different varieties. Varieties such as Elberta and J. H. Hale suffer more bud injury with minimum winter temperatures than do certain other varieties, such as Oriole, Rochester, Veteran, and Greensboro which are considered some of the hardiest sorts. Because of this difference in variety susceptibility growers in some areas have planted varieties with maximum bud hardiness. Some of the newer peach varieties, such as Redhaven, Triogem, and Jerseyland, have proved to be rather hardy and compare favorably with Jubilee and Halehaven.

*Figure 22.* Section through fruit buds of peach showing blackened flower parts killed by low temperature *(left)* and an uninjured bud *(right)*

Fruit buds that have been killed by low winter temperatures may be distinguished by the darkened, water-soaked appearance of the center of the buds (figure 22). This

area darkens and shrivels with age. Spring frost at blossoming time may injure the pistil or central part of the flower, thus reducing the prospects for a crop.

## Insect and Disease Control

THE important insects and diseases that attack the peach, with the recommendation for their control, are discussed in Cornell Extension Bulletin 711, *Control of Diseases and Insects in the Orchard.* Assistance in planning the spray schedule and information on timing the various sprays may be obtained from the local County Agricultural Agent, or by writing to the Department of Entomology or the Department of Plant Pathology at the New York State College of Agriculture, Cornell University, Ithaca, New York.

**January 1953**

Published by the New York State College of Agriculture at Cornell University, Ithaca, New York. L. R. Simons, Director of Extension. Published and distributed in furtherance of the purposes provided for in the Acts of Congress of May 8 and June 30, 1914.